

Pressure Booster System

Superbloc SBC.B

Installation/Operating Manual



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Installation/Operating Manual Superbloc SBC.B
Original operating manual

KSB Aktiengesellschaft Frankenthal

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Glossary

Accumulator

The accumulator serves to compensate for pressure losses in the piping system downstream of the pressure booster system which may be caused by the consumption of small quantities of water. As a result, the frequency of starts of the pressure booster system is minimised.

Automatic operation

The pump is started and stopped as a function of pressure.

Certificate of decontamination

A certificate of decontamination certifies that the pressure booster system has been properly cleaned and decontaminated to eliminate any environmental and health hazards arising from components in contact with the fluid handled.

1 General

1.1 Principles

This operating manual is supplied as an integral part of the type series and variants indicated on the front cover. The manual describes the proper and safe use of this equipment in all phases of operation.

The name plate indicates the type series/size, the main operating data and the order number. The series/serial number uniquely identifies the pressure booster system and serves as identification for all further business processes.

In the event of damage, immediately contact your nearest KSB service centre to maintain the right to claim under warranty.

Noise characteristics (⇒ Section 4.7 Page 14) .

1.2 Target group

This manual is aimed at the target group of trained and qualified specialist technical personnel. (⇒ Section 2.4 Page 8)

1.3 Other applicable documents

Table 1: Overview of other applicable documents

Document	Contents
Sub-supplier product literature	Operating manuals, logic diagram and other product literature of accessories and integrated machinery components

1.4 Symbols

Table 2: Symbols used in this manual

Symbol	Description
✓	Conditions which need to be fulfilled before proceeding with the step-by-step instructions
▷	Safety instructions
⇒	Result of an action
⇔	Cross-references
1. 2.	Step-by-step instructions
	Note Recommendations and important information on how to handle the product

2 Safety



All the information contained in this section refers to hazardous situations.

2.1 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
 DANGER	DANGER indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
 WARNING	WARNING indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
 CAUTION	CAUTION indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	General hazard in conjunction with one of the signal words indicates a hazard which will or could result in death or serious injury.
	Electrical hazard identifies information about protection against electrical voltage.
	In conjunction with the signal word CAUTION , this symbol indicates a hazard for the machine and its functions.

2.2 General

This manual contains general installation, operating and maintenance instructions that must be observed to ensure safe operation of the pressure booster system and prevent personal injury and damage to property.

The safety information in all sections of this manual must be complied with.

This manual must be read and completely understood by the responsible specialist personnel/operators prior to installation and commissioning.

The contents of this manual must be available to the specialist personnel at the site at all times.

Information attached directly to the pressure booster system must always be complied with and be kept in a perfectly legible condition at all times. This applies to, for example:

- Arrow indicating the direction of rotation
- Markings for connections
- Name plate

The operator is responsible for ensuring compliance with all local regulations which are not taken into account in this manual.

2.3 Intended use

The pressure booster system must only be operated within the operating limits described in the other applicable documents.

- Only operate pressure booster systems which are in perfect technical condition.
- Do not operate partially assembled pressure booster systems.
- The pressure booster system must only handle the fluids described in the product literature of the respective design variant.
- Never operate the pressure booster system without the fluid to be handled.

- Observe the information on minimum flow rates specified in the product literature (to prevent overheating, bearing damage, etc).
- Observe the information on maximum flow rates specified in the product literature (to prevent overheating, mechanical seal damage, cavitation damage, bearing damage, etc).
- Do not throttle the flow rate on the suction side of the pressure booster system (to prevent cavitation damage).
- Consult the manufacturer about any other modes of operation not described in the product literature.

Prevention of foreseeable misuse

- Never exceed the permissible operating limits (pressure, temperature, etc.) specified in the product literature.
- Observe all safety information and instructions in this manual.

2.4 Personnel qualification and training

All personnel involved must be fully qualified to install, operate, maintain and inspect the machinery this manual refers to.

The responsibilities, competence and supervision of all personnel involved in installation, operation, maintenance and inspection must be clearly defined by the operator.

Deficits in knowledge must be rectified by means of training and instruction provided by sufficiently trained specialist personnel. If required, the operator can commission the manufacturer/supplier to train the personnel.

Training on the pressure booster system must always be supervised by technical specialist personnel.

2.5 Consequences and risks caused by non-compliance with these operating instructions

- Non-compliance with these operating instructions will lead to forfeiture of warranty cover and of any and all rights to claims for damages.
- Non-compliance can, for example, have the following consequences:
 - Hazards to persons due to electrical, thermal, mechanical and chemical effects and explosions
 - Failure of important product functions
 - Failure of prescribed maintenance and servicing practices
 - Hazard to the environment due to leakage of hazardous substances

2.6 Safety awareness

In addition to the safety information contained in this manual and the intended use, the following safety regulations shall be complied with:

- Accident prevention, health and safety regulations
- Explosion protection regulations
- Safety regulations for handling hazardous substances
- Applicable standards and laws

2.7 Safety information for the operator/user

- The operator shall fit contact guards for hot, cold and moving parts and check that the guards function properly.
- Do not remove any contact guards while the pump is running.

- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)
- If shutting down the pump does not increase potential risk, fit an emergency-stop control device in the immediate vicinity of the pump (set) during pump set installation.

2.8 Safety information for maintenance, inspection and installation work

- Modifications or alterations of the pressure booster system are only permitted with the manufacturer's prior consent.
- Use only original spare parts or parts authorised by the manufacturer. The use of other parts can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that all maintenance, inspection and installation work is performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Carry out work on the pressure booster system during standstill only.
- The pump casing must have cooled down to ambient temperature.
- Pump pressure must have been released and the pump must have been drained.
- When taking the pressure booster system out of service always adhere to the procedure described in the manual.
- Decontaminate pressure booster systems which handle fluids posing a health hazard.
- As soon as the work is completed, re-install and/or re-activate any safety-relevant and protective devices. Before returning the product to service, observe all instructions on commissioning. (⇒ Section 6.1 Page 19)
- Make sure the pressure booster system cannot be accessed by unauthorised persons (e.g. children).

2.9 Unauthorised modes of operation

Always observe the limits stated in the product literature.

The warranty relating to the operating reliability and safety of the pressure booster system supplied is only valid if the equipment is used in accordance with its intended use. (⇒ Section 2.3 Page 7)

3 Transport/Temporary Storage/Disposal

3.1 Checking the condition upon delivery

1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify KSB or the supplying dealer (as applicable) and the insurer about the damage in writing immediately.

3.2 Transport

	NOTE
	<p>The pressure booster system is bolted to a pallet and wrapped in plastic foil for shipping and temporary storage. All connecting points are capped.</p>
	⚠ DANGER
	<p>Pressure booster system tipping over Risk of injury by falling pressure booster system!</p> <ul style="list-style-type: none"> ▷ Never suspend the pressure booster system by its power cable. ▷ Observe the applicable local health and safety regulations. ▷ Give due attention to the weight data and the centre of gravity. ▷ Use suitable, approved transport equipment, e.g. forklift or pallet trucks.



Fig. 1: Transporting the pressure booster system

1. Fit lifting lug, internal thread G 1½, (not included in scope of supply) on the membrane-type accumulator.
2. Attach lifting tackle to the pressure booster system at this point.
3. Lift the pressure booster system off the pallet using suitable lifting equipment and dispose of the pallet.
4. Carefully set the pressure booster system down at the place of installation.

3.3 Storage/Preservation

If commissioning is to take place some time after delivery, we recommend that the following measures be taken when storing the pressure booster system:

	<p>CAUTION</p> <p>Damage during storage by frost, moisture, dirt, UV radiation or vermin Corrosion/contamination of pressure boosting system!</p> <ul style="list-style-type: none"> ▷ Store the pressure booster system in a frost-proof room. Do not store outdoors.
	<p>CAUTION</p> <p>Wet, contaminated or damaged openings and connections Leakage or damage of the pressure booster system!</p> <ul style="list-style-type: none"> ▷ Only open the openings of the pressure booster system at the time of installation.

Store the pressure booster system in a dry, protected room where the atmospheric humidity is as constant as possible.

3.4 Return to supplier

1. Drain the pressure booster system as per operating instructions.
2. Always flush and clean the pressure booster system, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids.
3. If the fluids handled by the system leave residues which might lead to corrosion damage when coming into contact with atmospheric humidity, or which might ignite when coming into contact with oxygen, the pressure booster system must also be neutralised and blown through with anhydrous inert gas for drying purposes.
4. Always complete and enclose a certificate of decontamination when returning the pressure booster system.
Always indicate any safety and decontamination measures taken.

	<p>NOTE</p> <p>If required, a blank certificate of decontamination can be downloaded from the KSB web site at: www.ksb.com/certificate_of_decontamination</p>
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3.5 Disposal

	<p>⚠ WARNING</p> <p>Fluids posing a health hazard and/or hot fluids Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▷ Collect and properly dispose of flushing liquid and any residues of the fluid handled. ▷ Wear safety clothing and a protective mask, if required. ▷ Observe all legal regulations on the disposal of fluids posing a health hazard.
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1. Dismantle the pressure booster system.
Collect greases and other lubricants during dismantling.
2. Separate and sort the pump materials, e.g. by:
 - Metals
 - Plastics
 - Electronic waste
 - Greases and other lubricants
3. Dispose of materials in accordance with local regulations or in another controlled manner.

4 Description

4.1 General description

Fully automatic pressure booster package system with one vertical high-pressure pump and 200-litre membrane-type accumulator.

The pressure booster system is started and stopped as a function of pressure and ensures the required supply pressure at the consumer installations.

4.2 Designation

Example: SBC.B 2 4 E C

Table 4: Key to the designation

Code	Description
SBC	Pressure booster system with one pump
B	Generation
2	Pump size
4	Number of stages per pump
E	Connection to power supply E = single-phase AC current D = three-phase current
C	Connection types C, V or A

4.3 Name plate

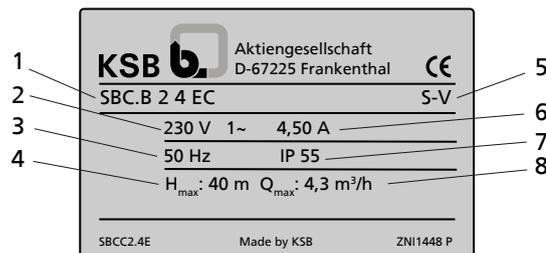


Fig. 2: Name plate (example)

1	Type series/size	2	Rated voltage
3	Frequency	4	Maximum head
5	Series code	6	Maximum power input
7	Enclosure	8	Max. flow rate

Key to the series code

Calendar year	2011	2012	2013	2014
1st half-year	S-Y	S-A	S-C	S-E
2nd half-year	S-Z	S-B	S-D	S-F

4.4 Design details

The pressure booster system comprises a non-self-priming multistage high-pressure centrifugal pump and a 200-litre membrane-type accumulator, mounted on a common baseplate and hydraulically connected.

Connection types C and V

The discharge-side check valve prevents backflow through the pump when the pump is not running and reduces the load on the mechanical seal.

Connection type A

Here this function is performed by the foot valve fitted in the inlet line.

4.5 Types of connection

The system can be installed in three different types of connection:

- **Connection type A**
 - The pressure booster system is operated in suction lift configuration
- **Connection type C**
 - Unpressurised inlet tank at the same or at a higher level
- **Connection type V**
 - The pressure booster system is connected directly to the water mains.

Connection diagrams (⇒ Section 10.3 Page 29)

4.6 Configuration and function



Fig. 3: Superbloc SBC

1	Accumulator	2	Pump
3	Pressure switch	4	Discharge side
5	Suction side		

Design The fully automatic pressure booster system pumps the fluid to the consumer installations in the set pressure range with a non-self-priming vertical high-pressure pump (1). The membrane-type accumulator reduces the number of pump starts.

Function Automatic operation
The pressure booster system is started and stopped as a function of pressure. When consumer installations are opened, the flow rate required is supplied from the membrane-type accumulator at first. If consumption continues, the pump is started. If consumption drops to zero again, the accumulator is filled again before the pump is stopped.

Connection type V

Pressure booster systems are standard equipped with a pressure switch for lack-of-water monitoring. If there is a lack of water, the pump stops immediately.

4.7 Noise characteristics

For the noise level of the individual pumps please refer to the pump's operating instructions.

4.8 Scope of supply

The following items are included in the scope of supply:

- One Movitec vertical high-pressure centrifugal pump
- 200-litre membrane-type accumulator on the discharge side
- Pressure indication on pressure gauge
- Pressure switch for setting the start and stop pressure
- One check valve on the discharge side
- Pressure switch for monitoring lack of water

Connection types C and V
only

Connection type V only

4.9 Dimensions and weights

For dimensions and weights please refer to the outline drawings of the pressure booster system.

5 Installation at Site

5.1 Checks to be carried out prior to installation

	⚠ WARNING
	<p>Installation on mounting surfaces which are unsecured and cannot support the load Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Use a concrete of compressive strength class C12/15 which meets the requirements of exposure class X0 to EN 206-1. ▷ The mounting surface must have set and must be completely horizontal and even. ▷ Observe the weights indicated.

	NOTE
	<p>The anti-vibration mounts of the pressure booster system provide adequate insulation against solid-borne noise.</p>

Check the structural requirements.
All structural work required must have been prepared in accordance with the dimensions stated in the outline drawings.

Place of installation

	NOTE
	<p>Do not install pressure booster systems next to sleeping or living quarters.</p>

If expansion joints are used for damping vibrations, their fatigue strength (endurance limit) must be given due consideration. Expansion joints must be installed to allow quick and easy replacement.

The place of installation must fulfil the following requirements:

- Frost-free
- Well ventilated
- Level
- Clean
- Sufficient stability
- Flood-proof
- No noxious gases
- Sufficient clearance for ventilation and dismantling

Ambient conditions

The following ambient conditions must be fulfilled:

Table 5: Ambient conditions

Characteristic	Value
Temperature during operation	0 °C to +40 °C
Relative humidity	50 %

	NOTE
	<p>Contact the manufacturer if the device is to be used in ambient conditions other than those stated above.</p>

5.2 Installing the pressure booster system

	<p>⚠ WARNING</p> <p>Top-heavy pressure booster system Risk of personal injury by pressure booster system tipping over!</p> <ul style="list-style-type: none"> ▷ Pressure booster systems awaiting final installation must be secured against tipping over. ▷ Firmly anchor the pressure booster system.
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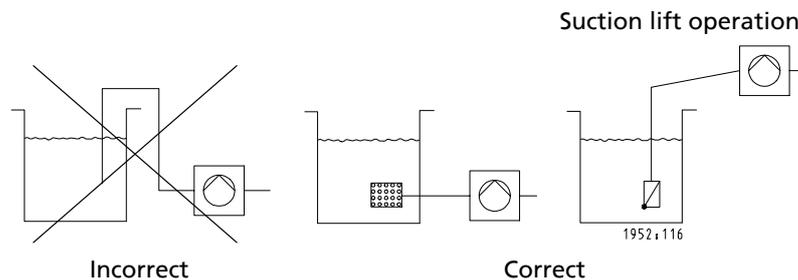
	<p>NOTE</p>
<p>In order to avoid transmission of piping forces onto the pressure booster system and transmission of solid-borne noise, we recommend to install length-limited expansion joints. For pressure booster systems installed in connection type A, this is permitted on the discharge side only.</p>	

Allow sufficient clearance for maintenance and repair work.

- ✓ All structural work required has been checked.
 - ✓ The dimensions of the concrete foundation are correct, and the concrete has set firmly.
 - ✓ Remove the packaging from the pressure booster system.
1. Mark out the anchoring holes on the floor as shown in the outline drawing (attached to the order confirmation).
 2. Drill the holes (max. diameter: 12 mm).
 3. Insert plug fixings of appropriate size.
 4. Set the pressure booster system down in its correct installation position.
 5. Use suitable bolts to anchor the pressure booster system firmly to its foundation.

5.3 Connecting the piping

	<p>CAUTION</p>
<p>Air pockets in suction line Pressure booster system cannot prime!</p> <ul style="list-style-type: none"> ▷ Lay piping with a continuously rising slope (as shown). ▷ For pressure booster systems installed in connection type A no expansion joints must be fitted in the suction line. 	



All other valves and fittings in the service pipes, e.g. gate valves, water meters and the non-return valve must be sized in accordance with the data provided by the responsible water company.

The use of length-limited expansion joints (KSB accessory) is advisable.

Connection diagrams (⇒ Section 10.3 Page 29)

- ✓ The pipelines have been anchored in close proximity to the pressure booster system and connected without transmitting any stresses or strains.

1. Thoroughly clean, flush and blow through all vessels, pipelines and connections (especially of new installations).
2. Before connecting the piping, remove the flange covers from the inlet and discharge pipes.

	CAUTION
	<p>Welding beads, scale and other impurities in the piping Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Free the piping from any impurities. ▷ If necessary, install a filter. ▷ Comply with the instructions set out in .

3. Connect the pressure booster system's inlet and discharge pipes to the site piping.
4. If required, install a filter in the piping (refer to figure: Filter in the piping).

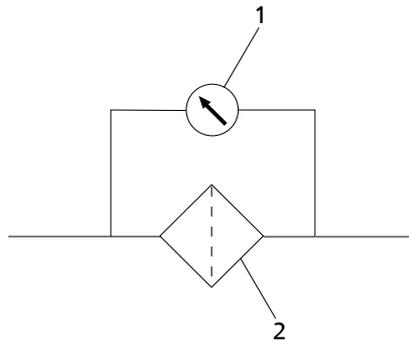


Fig. 4: Filter in the piping

1	Differential pressure gauge	2	Filter
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	NOTE
	<p>Use a filter with laid-in wire mesh of 0.5 mm x 0.25 mm (mesh size x wire diameter) made of corrosion-resistant material. Use a filter with a filter area three times the cross-section of the piping. Conical filters have proved suitable.</p>

5.4 Electrical connection

	⚠ DANGER
	<p>Work on the pressure booster system by unqualified personnel Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Always have the electrical connections installed by a trained electrician. ▷ Comply with regulation IEC 30364.

	⚠ WARNING
	<p>Incorrect connection to the mains Damage to the mains network, short circuit!</p> <ul style="list-style-type: none"> ▷ Observe the technical specifications of the local energy supply companies.

	NOTE
	<p>It is recommended to fit a motor protection device.</p>

	CAUTION
	<p>No pressure on the discharge side Pump starts as soon as voltage is applied!</p> <ul style="list-style-type: none"> ▷ When the system is commissioned/started up, the pump will start up as soon as the pressure booster system is energised, as the lack of pressure on the discharge side triggers the pressure switch and starts up the system.

For electrical connection observe the wiring diagram in the Annex (⇒ Section 10.2 Page 28).

5.5 Setting the pre-charge pressure

	⚠ WARNING
	<p>Wrong gas Danger of poisoning!</p> <ul style="list-style-type: none"> ▷ Use only nitrogen to charge the accumulator.

The pre-charge pressure in the accumulator should be set to 0.5 bar below the set start-up pressure.
Setting can be effected via a valve located under the cover at the top of the accumulator.

1. Compare the pre-charge pressure of the membrane-type accumulator against the name plate data.
2. Shut off the pressure booster system on the discharge side.
3. Open the accumulator drain valve to drain the accumulator. (⇒ Section 5.3 Page 16)
4. Remove the protective cap of the accumulator valve and check the pre-charge pressure with the aid of a tyre pressure gauge.
5. Add nitrogen as necessary.

Pre-charge pressure

Pre-charge pressure of accumulator $p = -0.5 \times p_{\text{start}}$
 p_{start} = start-up pressure of pressure booster system

Example:

$p_{\text{start}} = 5$ bar: pre-charge pressure $5 - 0.5 = 4.5$ bar
 $p_{\text{start}} = 2$ bar: pre-charge pressure $2 - 0.5 = 1.5$ bar

5.6 Checking the direction of rotation

	CAUTION
	<p>Drive and pump running in the wrong direction of rotation Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Refer to the arrow indicating the direction of rotation on the pump. ▷ Check the direction of rotation. If required, check the electrical connection and correct the direction of rotation.

- ✓ The pressure booster system is connected to the power supply.
1. Start the pressure booster system and stop it again immediately to determine the motor's direction of rotation.
 2. Check the direction of rotation.
The motor's direction of rotation must match the rotation arrow on the motor.
 3. If the motor runs in the wrong direction of rotation, check the electrical connection of the motor and the control system, if applicable.

6 Commissioning/Start-up/Shutdown

6.1 Commissioning/start-up

6.1.1 Prerequisites for commissioning/start-up

Before commissioning/start-up of the pressure booster system make sure that the following requirements are met:

- The pressure booster system has been properly connected to the electric power supply and is equipped with all protection devices.
- All relevant VDE standards and/or regulations applicable in the country of use are complied with.

	NOTE
The water company and the fire department must be informed in due time prior to commissioning/test running the system.	

6.1.2 Priming and venting the pressure booster system

	CAUTION
<p>Increased wear due to dry running Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ Never operate the pump set without liquid fill. ▷ Never close the shut-off element in the suction line and/or supply line during pump operation. 	

- ✓ The pipe unions between the pressure booster system and the piping have been re-tightened.
 - ✓ The flange bolting has been checked for firm seating.
 - ✓ The cooling air inlet and outlet openings on the motor are unobstructed.
 - ✓ The pre-charge pressure of the membrane-type accumulator has been checked. (⇒ Section 5.5 Page 18)
 - ✓ The shut-off elements upstream and downstream of the pressure booster system are closed.
1. Open/loosen the vent plug on the pressure booster system (refer to the pump's installation and operating manual).
 2. Slowly open the inlet-side shut-off element and prime the pressure booster system until the fluid to be handled escapes through all vent holes.
 3. Close and slightly tighten the vent plug.
 4. When the pressure booster system is running, loosen the vent plug again to let any remaining air escape.
 5. Re-tighten the vent plug firmly.

6.2 Switching on the pressure booster system

Commissioning should be carried out by specialist KSB staff.

	NOTE
Minor leakage of the mechanical seals during commissioning is normal and will cease after a short period of operation.	

- ✓ The pipe unions between the pressure booster system and the piping have been re-tightened.
- ✓ The flange bolting has been checked for firm seating.

- ✓ The cooling air inlet and outlet openings on the motor are unobstructed.
- ✓ The pre-charge pressure of the membrane-type accumulator has been checked. (⇒ Section 5.5 Page 18)
- ✓ The shut-off elements upstream and downstream of the pressure booster system are closed.
 1. Open the discharge-side shut-off element.
 2. Check whether the pressure booster system starts at the required start-up pressure.
 3. Verify that the pressure booster system is running smoothly.
 4. Close the discharge-side shut-off element for a short period in order to verify that the pressure booster system reaches the required discharge head.
 5. Close the discharge-side shut-off element, causing the pressure booster system to stop.

6.3 Checklist for commissioning/start-up

Table 6: Checklist

Actions	Completed
1 Read the operating instructions.	
2 Check the power supply and compare it against the name plate data.	
3 Check the earthing system (by measuring).	
4 Check the mechanical connection to the water mains. Re-tighten the flange bolting and pipe unions.	
5 Prime and vent the pressure booster system from the inlet side.	
6 Check the inlet pressure.	
7 Check the start and stop pressure; re-adjust, if necessary.	
8 Test the proper function of the lack-of-water and dry running protection equipment.	
9 Vent the pump for a second time after it has been running for 5 to 10 minutes.	
10 Check the pre-charge pressure.	
11 Record all system conditions that do not correspond to our specifications or to the purchase order in the commissioning report (i.e. inlet pressure + system pressure higher than 10 bar).	
12 Complete the commissioning report together with the operator/user and instruct the operator/user as to the function of the system.	

6.4 Shutdown

	NOTE
As long as the pressure booster system is out of operation, water is supplied directly at p_{inl} through the pressure booster system.	

The pressure booster system remains installed

- ✓ Sufficient fluid is supplied for the operation check run of the pressure booster system.
 1. Unplug the system from the electric mains.
 2. For prolonged shutdown periods, start up the pressure booster system regularly between once a month and once every three months for approximately five minutes.
This will prevent the formation of deposits within the pump and the pump intake area.

The pressure booster system is removed from the pipe and stored

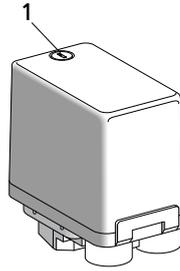
- ✓ The pressure booster system has been properly drained.
 1. Spray-coat the inside wall of the pump casing, and in particular the impeller clearance areas, with a preservative.

2. Spray the preservative through the suction and discharge nozzles.
It is advisable to then close the pump nozzles (e.g. with plastic caps or similar).
3. Oil or grease all exposed machined parts and surfaces of the pressure booster system to protect them against corrosion.

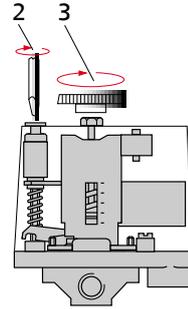
7 Setting the start and stop pressure

Pressure switch design

The screws for adjusting the start pressure and the stop pressure are located under the pressure switch cover.



External view of pressure switch



Internal view of pressure switch

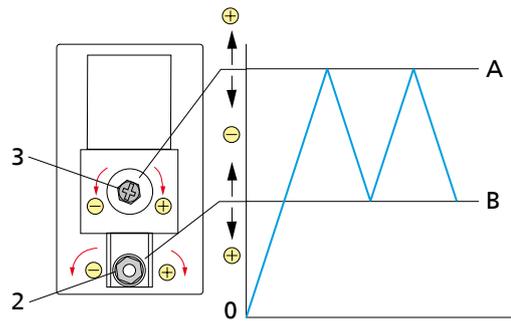


Fig. 5: Setting the start and stop pressure

1	Cover screw	2	Adjusting screw for stop pressure
3	Knurled screw for start-up pressure		
A	Upper switching point (stop pressure)	B	Lower switching point (start-up pressure)

1. Undo the cover screw (1) and remove the cover.
2. Turn the knurled screw (3) in direction + to increase the stop pressure, or in direction - to reduce the stop pressure.
3. Turn the adjusting screw (2) clockwise to reduce the start-up pressure or anti-clockwise to increase the start-up pressure.
4. Fit the cover again and tighten the cover screw (1).

8 Servicing/Maintenance

8.1 General information/Safety regulations

The operator ensures that all maintenance, inspection and installation work is performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.

	<p>⚠ DANGER</p> <p>Unintentional start-up of pressure booster system Danger to life!</p> <ul style="list-style-type: none"> ▷ The pressure booster system must be de-energised before repair or maintenance work is carried out. Switching the system off via the motor protection switch will not de-energise the motor power cables reliably.
	<p>⚠ WARNING</p> <p>Improper lifting/moving of heavy assemblies or components Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Use suitable transport devices, hoisting equipment and lifting tackle to move heavy assemblies or components.
	<p>⚠ WARNING</p> <p>Unintentional start-up of pressure booster system Risk of injury by moving parts!</p> <ul style="list-style-type: none"> ▷ Make sure the pressure booster system has been de-energised before commencing work on the pressure booster system. ▷ Make sure that the pressure booster system cannot be started up unintentionally.
	<p>⚠ WARNING</p> <p>Unqualified personnel performing work on the pressure booster system Risk of personal injury!</p> <ul style="list-style-type: none"> ▷ Always have repair and maintenance work performed by specially trained, qualified personnel.
	<p>CAUTION</p> <p>Incorrectly serviced pressure booster system Function of pressure booster system not guaranteed!</p> <ul style="list-style-type: none"> ▷ Regularly service the pressure booster system. ▷ Prepare a maintenance schedule for the pressure booster system, with special emphasis on lubricants, shaft seals and pump couplings.

Observe the general safety instructions and information. (⇒ Section 8 Page 23)

Observe the operating manual of the pump when performing work on the pumps.

In the event of damage you can always contact our service staff.

A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation of the pressure booster system with a minimum of maintenance expenditure and work.

Never use force when dismantling and re-assembling the pressure booster system.

8.1.1 Inspection contract

For all inspection and servicing work to be carried out at regular intervals we recommend taking out the inspection contract offered by KSB. Contact your Service Partner for details.

Checklist for commissioning, inspection and maintenance

8.2 Maintenance/Inspection

8.2.1 Supervision of operation

	<p>CAUTION</p> <p>Increased wear due to dry running Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ Never operate the pump set without liquid fill. ▷ Never close the shut-off element in the suction line and/or supply line during pump operation.
	<p>CAUTION</p> <p>Impermissibly high temperature of fluid handled Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Prolonged operation against a closed shut-off element is not permitted (heating up of the fluid). ▷ Observe the temperature limits in the data sheet and in the section on Operating limits.

While the pressure booster system is in operation, observe and check the following:

- The pressure booster system must run quietly and free from vibrations at all times.
- Start and stop pressures as pressure booster system switches (by means of pressure gauge).
- For pump monitoring refer to the technical product literature of the pump.

8.2.2 Checklist for inspections

Inspections must be carried out at least once a year on the basis of the following checklist:

- Check the pump and drive for quiet running and the mechanical seal for integrity.
- Check the flexible transmission elements for signs of wear.
- Check the shut-off, drain and check valves for proper functioning and tightness.
- Clean the strainer in the pressure reducer (if applicable).
- Check the expansion joints for wear (if applicable).
- Verify the pre-charge pressure level and check the accumulator for integrity, if required.
- Check the automatic switching functionality.
- Make sure that the entire system is working properly.
- Check the start and stop points of the pressure booster system.
- Check the water inflow (inlet pressure, lack-of-water monitoring).

9 Trouble-shooting

- A Pump does not start up (discharge pressure lower than start pressure)
- B Pump does not start up (connection type V, normal inlet pressure)
- C Pump does not start up (connection types A and C, normal water level in inlet tank)
- D Pump does not stop: (at zero flow) discharge pressure lower than stop pressure
- E Pump does not stop: (at zero flow) discharge pressure higher than stop pressure
- F Fluctuating discharge pressure
- G Pump delivers insufficient flow rate
- H Pump overheats, pump does not stop: see "Pump does not stop"
- I Pump blocked.
- J Premature wear of motor rolling element bearings
- K Motor protection switch triggered.
- L Excessive frequency of pump starts

Table 7: Trouble-shooting

A	B	C	D	E	F	G	H	I	J	K	L	Possible cause	Remedy ¹⁾
										X		Wrong mains voltage	Check values of the three phases.
X												No inlet pressure with connection type V (see pressure gauge)	Check suction-side shut-off elements and inlet.
X												No water in inlet tank with connection type C or A	Check shut-off elements and inlet tank inflow.
		X										Water level monitor in inlet tank set incorrectly or defective.	Adjust or replace.
		X										Pressure switch for dry running protection set incorrectly or defective.	Adjust or replace.
											X	Pressure drop caused by high suction-side pressure losses; pressure switch for dry running protection stops the pump and starts it again.	Check suction line.
											X	Pre-charge pressure of accumulator too low or too high.	Check cushion.
X		X	X	X	X	X	X				X	Inlet pressure too high or inlet pressure fluctuations too high for hydropneumatic mode of operation.	Fit pressure reducer upstream of pressure booster system.
X			X	X			X					Pressure switch defective or set incorrectly.	Adjust or replace.
			X			X	X					Wrong direction of rotation	Check the electrical connection of the motor and control system, if any.
			X			X	X	X				Pump not completely vented.	Vent.
X				X			X					Pressure gauge defective.	Replace.
			X				X					Suction-side or discharge-side shut-off element closed.	Open.
						X						Pump clogged or worn.	Clean or refurbish.
			X				X					Inlet pressure too low.	See table.
			X	X	X	X						Suction lift higher than 4 metres.	Adjust dry running protection to increase water level in inlet tank.
					X							Air ingress on the suction side	Seal pipes or prevent air intake at the suction strainer.

¹⁾ Release the pump pressure before attempting to remedy faults on pressure-retaining parts. Disconnect the pump from the power supply.

A	B	C	D	E	F	G	H	I	J	K	L	Possible cause	Remedy ¹⁾
						X						Foot valve defective	Repair or replace.
			X		X	X	X					Cavitation	Increase water level in inlet tank.
					X							Air in fluid handled	Ensure water is free of air.
					X	X						Suction-side turbulences	Modify pressure booster system.
						X						Suction-side or discharge-side shut-off elements not fully open.	Open.
						X						Suction-side pressure losses too high.	Modify pressure booster system.
			X			X	X	X				Pump reassembled incorrectly after dismantling.	See pump maintenance.
										X		Overheating of the motor	Clean motor air intake screen.
									X	X		Ambient temperature too high.	Ventilate the installation room.
										X		Wrong setting of motor protection switch	Set to rated motor current.
										X		Electrical connections not tightened correctly.	Re-tighten.
										X		Excessive motor power input	Check whether rotor can be easily rotated. Replace motor.

¹⁾ Release the pump pressure before attempting to remedy faults on pressure-retaining parts. Disconnect the pump from the power supply.

10 Related Documents

10.1 List of components

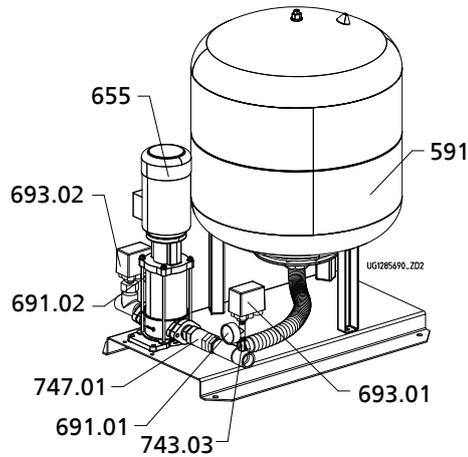


Fig. 6: General assembly drawing

Table 8: List of components

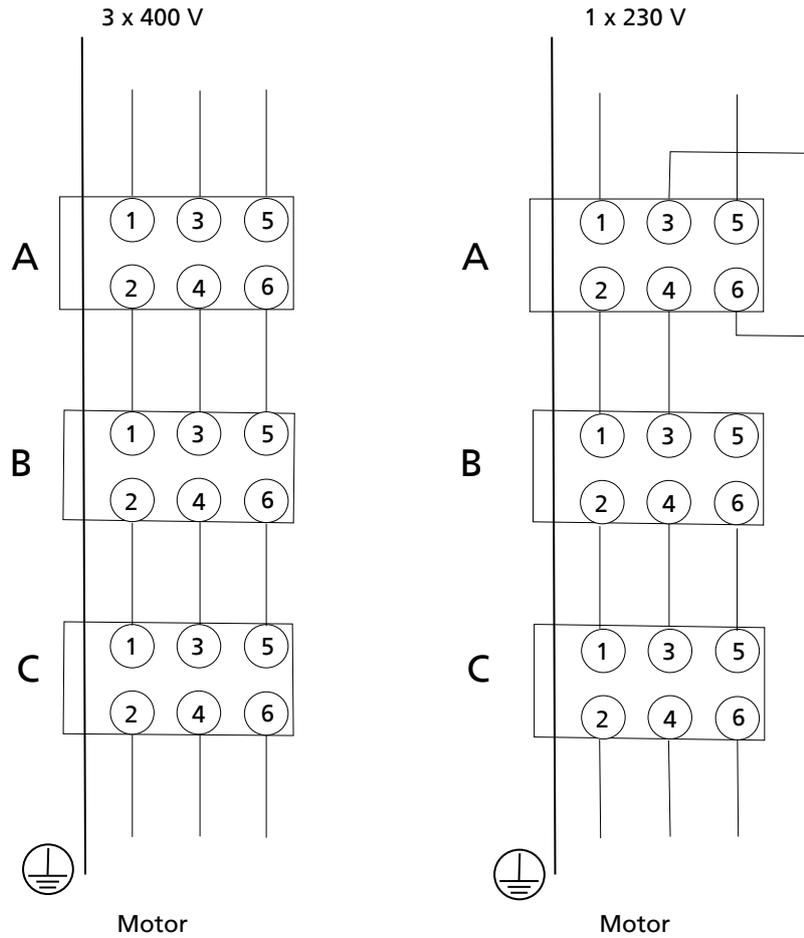
Part No.	Description	Mat. No.
591	Accumulator	01 099 282
655	Movitec pump	
691.01	Pressure gauge 0 - 10 bar	00 401 414
691.02	Pressure gauge 0 - 6 bar (connection type V only)	40 980 721
693.01	Pressure controller	42 208 490
693.02	Pressure controller (connection type V only)	40 980 726
743.03	Ball valve 1/4	00 410 125
747	Non-return valve (connection types V and C only)	01 041 318



NOTE

Pump spare parts correspond to Movitec in standard design (with oval flange).

10.2 Wiring diagram



A	Motor protection switch
B	Dry running protection via pressure switch or float switch
C	Pressure switch

10.3 Connection examples

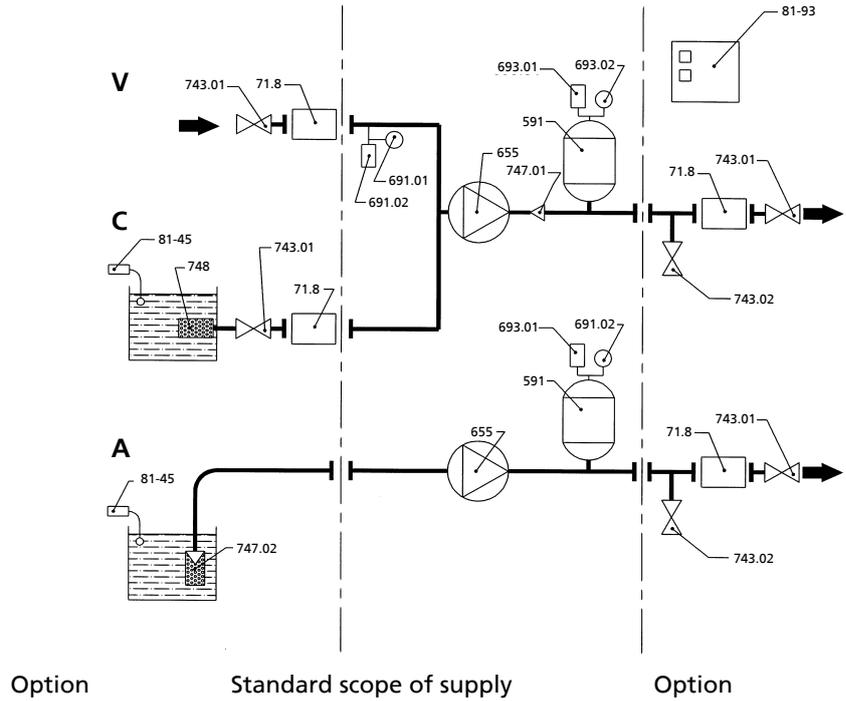


Table 9: Overview of components

Part No.	Standard scope of supply	No.	Options
747.01	Swing check valve	747.02	Suction strainer with foot valve
693.01	Pressure switch	748	Suction strainer
693.02	Pressure switch with changeover contact	81-45	Float switch
691.01	Pressure gauge, suction side	71.8	Expansion joint
691.02	Pressure gauge, discharge side	81.93	Motor protection switch, complete
655	Pump	743.01	Shut-off element of pressure booster system
591	Accumulator	743.02	Shut-off element for accumulator drainage

11 EC Declaration of Conformity

Manufacturer: **KSB Aktiengesellschaft**
Johann-Klein-Straße 9
67227 Frankenthal (Germany)

The manufacturer herewith declares that the product:

Superbloc SBC.B

KSB order number:

- is in conformity with the provisions of the following Directives as amended from time to time:
 - Pump (set): Machinery Directive 2006/42/EC

The manufacturer also declares that

- the following harmonised international standards have been applied:
 - ISO 12100,
 - EN 809/A1

Person authorised to compile the technical file:

Dr Frank Obermair
Technical Project Manager
Product Development, Business Unit Automation and Drives
KSB Aktiengesellschaft
Johann-Klein-Straße 9
67227 Frankenthal (Germany)

The EC Declaration of Conformity was issued in/on:

Place, date

.....²⁾.....

Name
Function
Company
Address
Address

²⁾ A signed, legally binding declaration of conformity is supplied with the product.

12 Certificate of Decontamination

Type
 Order number/
 Order item number³⁾

Delivery date

Field of application:

Fluid handled³⁾:

Please tick where applicable³⁾:

 <input type="checkbox"/> radioactive	 <input type="checkbox"/> explosive	 <input type="checkbox"/> corrosive	 <input type="checkbox"/> toxic
 <input type="checkbox"/> harmful	 <input type="checkbox"/> bio-hazardous	 <input type="checkbox"/> highly flammable	 <input type="checkbox"/> safe

Reason for return³⁾:

Comments:

.....

The pressure booster system/accessories have been carefully drained, cleaned and decontaminated inside and outside prior to dispatch/placing at your disposal.

- No special safety precautions are required for further handling.
- The following safety precautions are required for flushing fluids, fluid residues and disposal:

We confirm that the above data and information are correct and complete and that dispatch is effected in accordance with the relevant legal provisions.

.....

Place, date and signature	Address	Company stamp
---------------------------	---------	---------------

³⁾ Required fields

13 Commissioning Report

The KSB pressure booster system specified below was today commissioned by the undersigned authorised KSB customer service engineer who created this report.

Pressure booster system details

Type series
 Size
 Serial number
 Order No.

2 Purchaser/place of installation

Purchaser	Place of installation
Name
Address
.....

3 Operating data For further details refer to the circuit diagram.

Start-up pressure p_{start} bar

Inlet pressure monitoring $p_{inl} - x$
 (setting of inlet pressure switch)

Stop pressure p_{stop} bar

Inlet pressure p_{inl} bar

Pre-charge pressure of accumulator $p_{pre-charge}$ bar

4 Special information

According to DVGW Worksheet W 314, the system operator must notify the responsible water company of commissioning.

If, in addition, the system is operated with pressure vessels of groups III/IV to the Pressure Vessel Directive, commissioning shall also be reported to the responsible TÜV (German Association for Technical Supervision).

The system operator/operator's representative herewith confirms to have received instructions on how to operate and service the pressure booster system. The relevant circuit diagrams and operating instructions have been handed over.

Non-conformities found during commissioning	Deadline for remedial action
Non-conformities
1
.....
.....
.....

Name of KSB representative	Name of purchaser or representative
.....

Place

Date

.....

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